

### **REMARKS**

Claims 1, 2, 4-6, 9, 10, 12, 14-16, 19, 20, 22-27, 29, 30, 32-34, 37, 38, and 40-56 are currently pending in the present application. Claims 1, 12, 22, 29, 38, 46, 51, 53, and 55 have been objected to. Claims 1, 2, 4-6, 9, 10, 12, 14-16, 19, 20, 22-27, 29, 30, 32-34, 37, 38, and 40-56 are rejected under 35 U.S.C. § 103. Claims 1, 12, 22, 29, 38, 46, 51, 53, and 55 have been amended. Claims 57-66 are added. No claims are canceled. Therefore, claims 1, 2, 4-6, 9, 10, 12, 14-16, 19, 20, 22-27, 29, 30, 32-34, 37, 38, and 40-65 will be pending in the application after entry of the foregoing claim amendments. Claims 1, 12, 22, 29, 38, 46, 51, 53, and 55 are independent claims.

### **Telephone Conversation with Examiner**

Examiner Stace is thanked for the telephone conversation conducted on January 12, 2010. Clarifying claim amendments and the asserted arts were discussed. It appears that properly amended claims would overcome the rejections under 35 U.S.C. § 103 over the asserted references. Examiner Stace indicated that he will consider the amendments and remarks submitted in the formal reply.

### **Claim Amendments**

The independent claims 1, 12, 22, 29, 38, 46, 51, 53, and 55 have been amended for clarity. Additionally, in accordance to the telephone conversation with Examiner Stace, dependent claims 57-66 have been added to capture various embodiments. Support for amendments can be found throughout the as-filed application, for example, at paragraphs [0047], [0062], [0065], [0068], [0082], [0083], [0087], and FIG. 4. No new matter has been added.

### **Claim Rejections – 35 U.S.C. § 103**

Claims 1, 2, 4-6, 9, 10, 12, 14-16, 19, 20, 22-27, 29, 30, 32-34, 37, 38, and 40-56 stand rejected under 35 U.S.C. § 103(a) as being obvious over U.S. Patent No. 5,485,608 to Lomet *et al.* (“Lomet”) in view of one or more of “Efficient Locking for Concurrent Operations on B-Trees” (“Lehman”) and U.S. Patent No. 5,434,994 to Shaheen *et al.* (“Shaheen”). Without

prejudice or waiver, Applicants have amended independent claims 1, 12, 22, 29, 38, 46, 51, 53 and 55 to further clarify the claimed subject matter.

Applicants respectfully request withdraw of the rejections because, Lomet, Lehman, and Shaheen, whether considered individually or in any combination, neither disclose nor suggest:

- “said at least one entry from said allocation layer is ***stored only on its corresponding computing device*** of a plurality of computing devices and said at least one entry from said B-link tree layer is ***replicated*** on each of said plurality of computing devices” as recited in independent claims 1, 12, 29, 38, 51, 53;
- “said entries from said allocation layer are ***stored only on their corresponding computing devices*** of a plurality of computing devices and said entries from said upper layer are ***replicated*** on each of said plurality of computing devices” as recited in independent claim 22;
- “said entries from the upper layer are ***replicated*** to both said first server and said second server, while entries from said allocation layer at said first server are ***stored only on said first server***, and entries from said allocation layer at said second server are ***stored only on said second server***” as recited in independent claim 46; or
- “said entries from the upper layer are ***replicated*** to both said first server location and said second server location, while entries from said allocation layer at said first server location are ***stored only on said first server location***, and entries from said allocation layer at said second server location are ***stored only on said second server location***” as recited in independent claim 55.

The claimed embodiments relate to implementing a single log for a B-link tree data structure that are distributed across multiple computing devices (Specification, [0018]). The single log stores log entries from both a B-link tree layer and an allocation layer. Each of the entries from the allocation layer is stored only on its corresponding computing device, whereas entries from the B-link tree layer are replicated on each of the multiple computing devices.

Thus, when recovery of the B-link tree data structure can be done by replaying the log entries stored locally on each of the multiple computing devices (Specification, [0087]).

Lomet does not disclose, teach or suggest replicating log entries from B-link tree layer on each of a plurality of computing devices while storing log entries from the allocation layer only on their corresponding computing devices. The Office Action suggests that Lomet teaches “said at least one entry from said B-link tree layer is replicated among said plurality of computing devices” because Lomet teaches shipping “database data” to “requesting computers to respond to requests (Office Action, Page 6, Paragraph 3, citing Lomet, col 2, lines 11-16). Applicants respectfully disagree.

Lomet relates to logging transactions of a data sharing system, where multiple nodes, or computer computing devices, share a collection of shared disks (*see* Lomet col. 1, lines 59-62). The passage asserted by the Office Action discusses loading and updating the same data from multiple computing devices, which results in multiple computing devices logging actions for the same data (*see* Lomet, col 1 line 65 - col 2, line 16). Although the asserted passage discloses multiple computing devices logging actions for the same data, there is no teaching or suggestion that any of the log entries generated by each of the computing devices are replicated across the multiple computing devices. In fact, Lomet is directed to providing private logs for each computing device, where each computing device maintains its own redo log independently of other computing devices (*see* Lomet col. 2, lines 51-53, and col. 5 lines 52-56). Because Lomet as-applied does not disclose, teach or suggest replicating log entries on each of a plurality of computing devices, Lomet certainly does not disclose, teach or suggest replicating log entries from B-link tree layer on each of a plurality of computing devices while storing log entries from the allocation layer only on their corresponding computing device.

Neither Lehman nor Shaheen, whether considered individually or in combination, overcomes the shortcomings of Lomet. Lehman discloses merely general information related to B-Link tree data structure. There is no teaching of replicating log entries across a plurality of computing devices in Lehman. While Shaheen discloses replicating log entries across a plurality

of computing devices, Shaheen fails to teach or suggest storing log entries from the allocation layer only on their corresponding computing device.

Shaheen discloses a system for maintaining replicated data in a data processing system with multiple servers (Shaheen, Abstract). According to Shaheen, data updates are logged for each server in separate modification logs (*see* Shaheen, col. 5, lines 17-18). The separate logs from each server are merged into a merged log, and then sent back to the servers (*see* Shaheen, col. 4, lines 62-66). In other words, all log entries in the logs are replicated and distributed across the multiple servers, irrespective of the subject matter of each log entry. In contrast, the claimed embodiments selectively replicate log entries. Specifically, entries from the B-link tree layer are replicated on each of the multiple computing devices, whereas entries from the allocation layer are local to their corresponding computing device. Therefore, Shaheen does not teach or suggest replicating log entries from B-link tree layer among a plurality of computing devices while keeping log entries from the allocation layer local to the corresponding computing device as recited in independent claims 1, 12, 22, 29, 38, 46, 51, 53, and 55.

Therefore, for the foregoing reasons, Lomet, Lehman, and Shaheen, whether considered individually or in any combination, neither disclose nor suggest the subject matter in independent claims 1, 12, 22, 29, 38, 46, 51, 53, and 55. Claims 2, 4-6, 9, 10, 14-16, 19, 20, 23, 26, 27, 30, 32-34, 37, 40-45, 47, 50, 52, 54, and 56 depend upon one of claims 1, 12, 22, 29, 38, 46, 51, 53, and 55. Therefore, Applicants respectfully submit that the dependent claims are also patentably distinct over Lomet, Lehman, and Shaheen. Accordingly, Applicants respectfully request withdraw of the rejections under 35 U.S.C. § 103 over the asserted arts.

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**PATENT**

**CONCLUSION**

In view of the foregoing amendments and remarks, Applicants respectfully submit that the claims are allowable and that the present application is in condition for allowance. Reconsideration of the application and an early Notice of Allowance are respectfully requested. In the event that the Examiner cannot allow the present application for any reason, the Examiner is encouraged to contact the undersigned to discuss the resolution of any remaining issues.

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**/Joseph F. Oriti/**

Joseph F. Oriti  
Registration No. 47,835

Woodcock Washburn LLP  
Cira Centre  
2929 Arch Street, 12th Floor  
Philadelphia, PA 19104-2891  
Telephone: (215) 568-3100  
Facsimile: (215) 568-3439